

A. All Claim Limitations Are Not Taught

Claims 87-93 call for a composition comprising a thermoplastic resin and a material comprising at least 10% by weight cristobalite and at least 10% by weight aluminum oxide, wherein the material is in a quantity of less than about 2% by weight of the total composition. Thus, the maximum quantity of cristobalite and aluminum oxide combined is less than about 2% by weight of the total composition.

To establish a *prime facie* case of obviousness, "all the claim limitations must be taught or suggested by the prior art." *In re Royka*, 490 F. 2d 981, 180 USPQ 580 (CCPA 1974); MPEP § 2143.03.

In contrast to claims 87-93, the Abstract does not describe any composition wherein the combined cristobalite and aluminum oxide content is less than about 2% by weight. Rather, the only relevant values indicated by the Abstract are values of 5-80 wt. % of cristobalite and 2-20 wt. % of aluminum oxide. Even using the lower limits of each of these components, the combined value of 7 wt. % (5 wt. % + 2 wt. %) is much greater (over three times) than the less than about 2% limit called for in claims 87-93.

In the application of prior art, the entirety of the teaching therein must be considered:

PRIOR ART MUST BE CONSIDERED IN ITS ENTIRETY,
INCLUDING DISCLOSURES THAT TEACH AWAY FROM THE
CLAIMS

A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention.

MPEP § 2141.03

In addition to the range of contents, the composition of thermoplastic polymer, cristobalite powder, aluminum oxide powder, and quartz powder identified in the Abstract is taught to provide an item having a marble-like texture and appearance (see the USE/ADVANTAGE section of the Abstract). However, there is no indication that a less than about 2% by weight of cristobalite and aluminum oxide, combined with

thermoplastic polymer and quartz powder in the identified ranges, can even produce a composition having a marble-like texture and appearance.

Accordingly, the Abstract does not teach the claim limitation of less than about 2% by weight of cristobalite and aluminum oxide.

In addition, dependent claim 89 calls for vitreous material and dependent claim 93 calls for particle sizes less than 75 microns. Nowhere does the Abstract teach or suggest these claim elements.

B. No Suggestion or Motivation

To establish a *prime facie* case of obviousness, "there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings." MPEP § 2143.

Claims 87-93 call for a composition comprising a thermoplastic resin and a material comprising cristobalite and aluminum oxide. The addition of this material to the thermoplastic resin produces favorable effects on the molding process of the thermoplastic resin, such as increasing part production rate and reducing energy requirements. On the other hand, the Abstract describes a composition for producing an item with marble-like texture and appearance. Nowhere does the Abstract teach or suggest adding material to thermoplastic resin for the purpose of enhancing the molding process. There is no commonality of purpose, goal or effect between the claimed subject matter and the teachings of the Abstract. Thus, there is no suggestion or motivation in the Abstract to make modifications which would be required to achieve the composition called for in claims 87-93.

C. Prior Art Is Rendered Unsatisfactory

In establishing a *prima facie* case of obviousness, "[i]f the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification." *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984); MPEP § 2143.01.

Claims 87-93 call for a composition comprising a thermoplastic resin and a material comprising cristobalite and aluminum oxide which combined make up less than about 2% by weight of the total composition. As shown by the Declaration of Jess R. Booth, attached hereto as Exhibit A, a composition of polymethyl methacrylate polymer and 1% by weight of an aluminosilicate, which contains both cristobalite and aluminum oxide, produces an article that is clear and transparent. A photograph of an article made from such a composition is attached to the Declaration as Exhibit 1.

In contrast, the Abstract describes a composition that produces an item with marble-like texture and appearance. Modification of the Abstract in accordance with claims 87-93 renders the Abstract unsatisfactory for its intended purpose of producing a marble-like texture and appearance.

D. Summary

In summary, the Abstract does not teach or suggest the value of 2% by weight called for in claims 87-93, and does not teach or suggest a composition including vitreous material, or a particle size of 75 microns. The Abstract neither teaches nor suggests that the material claimed, when added to thermoplastic resin in the amount claimed, produces favorable effects on the molding process of thermoplastic resin, such as increasing part production rate and reducing energy requirements. Moreover, modification of the Abstract in accordance with claims 87-93 renders the reference unsatisfactory for the purpose of producing an item having a marble-like texture and appearance as taught by the Abstract. Accordingly, given the standards reflected in the MPEP, the Abstract does not support a *prima facie* case of obviousness against claims 87-93.

II. Rejections over Akao et al.

The rejections of claims 32-93 as obvious over Akao et al. is respectfully traversed. Akao et al. describe various light-shielding substances that can be added to polymers to produce a light-resistant packaging material for use with photosensitive items. Although the amount of light-shielding substances in general can range from 0.01 to 30 wt. % of the total composition, the actual amount of any particular light-

shielding substance depends on the substance's light-shielding ability. According to the reference, light-shielding materials having a refractive index of less than 1.50 are not suitable, and preferred light-shielding materials have a specific gravity of not less than 3.1.

A. Claims 32-72, and 80-93

1. All Claim Limitation Are Not Taught

To establish a *prime facie* case of obviousness, "all the claim limitations must be taught or suggested by the prior art". *In re Royka*, 490 F. 2d 981, 180 USPQ 580 (CCPA 1974); MPEP § 2143.03.

Claims 32-72 call for a composition, an article of manufacture or a method all involving a composition comprising a thermoplastic resin and a material, including aluminosilicate material (claims 32-38, 45-58) or specifically silicon dioxide and aluminum oxide (claims 39-44, 59-72), wherein the material is in a quantity of less than about 2% by weight of the composition. Claims 80-93 call for a composition comprising a thermoplastic resin and a material comprising cristobalite and aluminum oxide, wherein the material is in a quantity of less than about 2% by weight of the composition. The addition of this material to the thermoplastic resin produces favorable effects on the molding process of the thermoplastic resin, such as increasing part production rate and reducing energy requirements.

Akao et al. do not indicate any quantity for aluminosilicate material or the combination of silicon and aluminum oxides or the combination of cristobalite and aluminum oxide. Although Akao et al. state that a light-shielding substance can be in the range of 0.01 to 30 wt % in total (column 19, lines 26-27), Akao et al. also indicate that the actual quantity for a specific light-shielding substance "varies according to light-shielding ability" (column 19, lines 29-30). As noted above, the MPEP reflects the principle that the teachings of a reference must be considered in their entirety. Therefore, a specific light shielding material, to satisfy the requirements of Akao et al., may not be applied in such a broad range to achieve the results of the invention.

The actual range for aluminosilicate material or the specific combination of silicon and aluminum oxides or the specific combination of cristobalite and aluminum oxide which would be effective in the invention of Akao et al. can be far different from the indicated range of 0.01 to 30 wt % in total. Since Akao et al. do not teach or suggest these materials, Akao et al. are silent as to the actual ranges for these combinations. An effective range of less than about 2% by weight for aluminosilicate material or for the combination of silicon and aluminum oxides, or for the combination of cristobalite and aluminum oxide, as required by claims 32-72 and 80-93 is not taught or suggested by Akao et al.

2. No Suggestion or Motivation

To establish a *prime facie* case of obviousness, "there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings." MPEP § 2143.

In contrast to the claim recitations of aluminosilicate material or the combination of silicon and aluminum oxides or the combination of cristobalite and aluminum oxide, Akao et al. do not describe such compositions. Although Akao et al. indicate individually that silicon and aluminum oxides can be used as a light-shielding material, and that certain light-shielding materials can be blended, namely, acetylene black or Ketjen carbon black blended with oil furnace black (column 16, lines 40-44), Akao et al. do not suggest the particular combination of silicon and aluminum oxides, or the particular combination of cristobalite and aluminum oxide and do not suggest aluminosilicate. There are over 68 different light-shielding substances listed by Akao et al. in column 16, lines 1-29. This provides over 4,500 (68 X 67) pair-wise combinations and over 300,000 (68 X 67 X 66) triple combinations of light-shielding materials that could be prepared. Because there are so many combinations to choose from, no particular combination is suggested or preferred. Consequently, there is no suggestion or motivation to modify Akao et al. to produce the particular combination of silicon and

aluminum oxides or the particular combination of cristobalite and aluminum oxide or of using aluminosilicate.

The argument that any particular combination of light-shielding materials is obvious involves an improper "obvious to try" rationale. MPEP § 2145 (X)(B). It is well settled that an invention is not obvious under § 103 if "what would have been 'obvious to try' would have been to vary all parameters or try each of numerous possible choices until one possibly arrived at a successful result". *In re O'Farrell*, 853 F. 2d 894, 7 USPQ 2d 1673 (Fed. Cir. 1988); MPEP § 2145 (X)(B). There is no suggestion available in Akao et al.

There is no commonality of purpose, goal or effect between the claimed subject matter and the teachings of Akao et al. Claims 32-72 and 80-93 introduce material to thermoplastic resin to produce favorable effects on the molding process of the thermoplastic resin, such as increasing part production rate and reducing energy requirements. On the other hand, Akao et al. describe various light-shielding substances that can be added to polymers to produce a light-resistant packaging material for use with photosensitive items. Thus, there is no motivation in Akao et al. to make modifications which would be required to achieve the composition called for in claims 32-72 and 80-93.

3. Prior Art Is Rendered Unsatisfactory

In establishing a *prima facie* case of obviousness, "[i]f the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification." *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984); MPEP § 2143.01.

Claims 32-72 call for a composition comprising a thermoplastic resin and a material, aluminosilicate or silicon dioxide and aluminum oxide, wherein the material is in a quantity of less than about 2% by weight of the composition. Similarly, claims 80-93 call for a composition comprising a thermoplastic resin and a material comprising

cristobalite and aluminum oxide, wherein the material is in a quantity of less than about 2% by weight of the composition.

As shown by the Declaration of Jess R. Booth, attached hereto as Exhibit A, a composition of polymethyl methacrylate polymer and 1% by weight of an aluminosilicate, which contains both cristobalite and aluminum oxide, produces an article that is clear and transparent. A photograph of an article made from such a composition is attached to the Declaration as Exhibit 1, where the article is clearly seen to permit the passage of light. Such a composition is unsuitable as a light-shielding material. Because modifying Akao et al. in accordance with the claims renders the reference unsatisfactory for its intended purpose of protecting photosensitive materials, Akao et al. provide no suggestion or motivation to make the claimed invention which would frustrate the purpose of the Akao et al. teachings.

4. Prior Art Teaches Away

"A *prime facie* case of obviousness may also be rebutted by showing that the art, in any material respect, teaches away from the claimed invention." *In re Geisler*, 116 F. 3d 1465, 1471, 43 USPQ 2d 1362, 1366 (Fed. Cir. 1997); MPEP § 2143.05 (III).

Claims 32-58 call for a thermoplastic resin and an aluminosilicate material. As stated in the Declaration of Jess R. Booth attached hereto as Exhibit A, an aluminosilicate can have a refractive index of 1.495. However, Akao et al. indicate that light-shielding materials having a refractive index of less than 1.50 are "unsuitable" (column 17, lines 36-39); and in doing so, teach away from the claimed invention.

Moreover, an aluminosilicate such as obsidian can have a specific gravity (or density) of 2.0-2.5, as shown in Table 1 from the Encyclopedia of Volcanoes, attached hereto as Exhibit B. However, Akao et al. indicate that preferred light-shielding materials have a specific gravity of not less than 3.1 (column 18, lines 1-4). Because Akao et al. indicate that an aluminosilicate is not preferred, Akao et al. again teach away from the claimed invention.

5. Summary

In sum, Akao et al. do not teach or suggest aluminosilicate or the particular combination of silicon and aluminum oxides or the particular combination of cristobalite and aluminum oxide, and the reference does not teach or suggest a quantity of material less than about 2%. Further, modification of Akao et al. in accordance with claims 32-72 and claims 80-93 renders Akao et al. unsatisfactory by failing to provide suitable light-shielding material. Also, Akao et al. teach away from claims 32-58 by indicating refractive index and specific gravity values not consistent with these claims.

B. Claims 73-79

To establish a *prime facie* case of obviousness, "there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings." MPEP § 2143. However, "[i]f the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification." *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984); MPEP § 2143.01.

Claims 73-79 call for a composition comprising a thermoplastic resin and a material comprising aluminum oxide, wherein the total quantity of material is in a quantity of less than about 2% by weight of the composition. As shown by the Declaration of Jess R. Booth, attached hereto as Exhibit A, a composition of polymethyl methacrylate polymer and 1% by weight of an aluminosilicate, which contains aluminum oxide, produces an article that is clear and transparent. A photograph of an article made from such a composition is attached to the Declaration as Exhibit 1, where the article is clearly seen to permit the passage of light. Such a composition would be unsuitable as a light-shielding material. Because modifying Akao et al. in accordance with the claims renders the reference unsatisfactory for its intended purpose of protecting photosensitive materials, Akao et al. provides no suggestion or motivation to make the claimed invention. Accordingly, claims 73-79 are not *prime facie* obvious in view of Akao et al.

Rejections over Hedrick et al.

The rejections of claims 32-93 over Hedrick et al. is respectfully traversed. Hedrick et al. describe various fillers that can be added to polyamide resins for reinforcement. A coupling agent is essential for the invention. The quantity of filler ranges from about 2% to 55% by volume, and the quantity of filler must be greater than 2% by volume to provide suitable reinforced polyamide compositions.

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To establish a *prime facie* case of obviousness, "all the claim limitations must be taught or suggested by the prior art." *In re Royka*, 490 F. 2d 981, 180 USPQ 580 (CCPA 1974); MPEP § 2143.03.

Claims 32-93 call for a composition comprising a thermoplastic resin and a material, wherein the material can comprise aluminosilicate material, silicon and aluminum oxides, cristobalite and aluminum oxide, and the quantity of material is less than about 2% by weight of the composition. In contrast, Hedrick et al. indicate that the quantity of filler ranges from about 2% to about 55% by volume (column 8, lines 49-52).

Assuming that the volume of a mixture of polyamide and a small amount of aluminosilicate is equal to the volume of polyamide plus the volume of the aluminosilicate, the volume percent of 2% by weight aluminosilicate can be determined as follows:

- a. The density of aluminosilicate is taken as 2.5 gm/cm^3 , the maximum density of obsidian, an aluminosilicate, as shown in Table 1 from the Encyclopedia of Volcanoes, attached hereto as Exhibit B.
- b. The density of polyamide (or nylon) is taken as 1.16 gm/cm^3 , as shown in the properties of nylon table from the Handbook of Plastics Testing Technology, attached hereto as Exhibit C.
- c. In a 100 gm sample of the composition:

i. volume of aluminosilicate: 2 weight % (or 2 gm) at 2.5 gm/cm³ =

$$2 \text{ g} \times 1/2.5 \text{ gm/cm}^3 = 0.8 \text{ cm}^3$$

ii. volume of polyamide: 98 weight % (or 98 gm) at 1.16 gm/cm³ =

$$98 \text{ g} \times 1/1.16 \text{ gm/cm}^3 = 84.5 \text{ cm}^3$$

iii. Volume percent of aluminosilicate in polyamide:

$$[0.8 \text{ cm}^3 / 0.8 \text{ cm}^3 + 84.5 \text{ cm}^3] \times 100 = 0.94 \text{ volume \%}$$

Therefore, 2% by weight called for in the claims is equivalent to 0.94 volume %. This value is outside the range of about 2% to about 55% by volume indicated in Hedrick et al. Moreover, Hedrick et al. indicate that the quantity of filler must be greater than 2% by volume "to provide reinforced polyamide compositions with the exceptional improvement in mechanical properties achieved by the compositions of this invention" (column 8, lines 61-65). Thus, the 2% by weight claim limitation is not taught or suggested by Hedrick et al.

B. No Suggestion or Motivation

To establish a *prime facie* case of obviousness, "there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings." MPEP § 2143.

Claims 32-93 call for a composition comprising a thermoplastic resin and a material wherein the material can comprise aluminosilicate material, silicon and/or aluminum oxides, cristobalite and aluminum oxide. However, the present claims do not call for a coupling agent or any chemical substance identified in Hedrick et al. as a coupling agent (column 9, lines 35-68, and column 10, lines 1-36). Further, Hedrick et al. indicate that a coupling agent is an "essential" component (column 9, lines 28-30). Because a coupling agent is an essential component, Hedrick et al. cannot teach or suggest the claimed composition which lacks any coupling agent.

There is no commonality of purpose, goal or effect between the claimed subject matter and the teachings of Hedrick et al. Claims 32-93 introduce material to thermoplastic resin to produce favorable effects on the molding process of the thermoplastic resin, such as increasing part production rate and reducing energy requirements. On the other hand, Hedrick et al. describe various fillers that can be added to polyamide resins for reinforcement. Thus, there is no motivation in Hedrick et al. to make modifications which would be required to achieve the composition called for in claims 32-93.

C. Prior Art Is Rendered Unsatisfactory

In establishing a *prima facie* case of obviousness, "[i]f the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification." *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984); MPEP § 2143.01.

Claims 32-72 call for a composition comprising a thermoplastic resin and a material, including aluminosilicate material or silicon dioxide and aluminum oxide where the material is in a quantity of less than about 2% by weight of the composition. Similarly, claims 80-93 call for a composition comprising a thermoplastic resin and a material comprising cristobalite (a particular structure of silicon dioxide) and aluminum oxide, wherein the material is in a quantity of less than about 2% by weight of the composition.

As shown in Table 4 of the specification, the addition of 1.5 % by weight aluminosilicate to Zytel 101L, which is a commercial brand of polyamide, reduces the Notched Izod impact value of polyamide. The polyamide by itself gives a Notched Izod impact value of 1.2 whereas the polyamide plus aluminosilicate give a Notched Izod impact value of 0.96. The Notched Izod impact test is an indicator of impact strength. Thus, the addition of aluminosilicate reduces the strength of the polyamide.

In contrast, the purpose of Hedrick et al. is to provide reinforced polyamide compositions which have improved mechanical properties such as high impact strength

(column 3, lines 1-35). Because a polyamide composition in accordance with claims 32-73 and claims 80-93 has a lower impact strength than polyamide alone, modification of Hedrick et al. in accordance with the claims renders the reference unsatisfactory for its intended purpose of improving impact strength. Accordingly, there is no suggestion or motivation to modify Hedrick et al.

Moreover, claims 32-93 do not call for a coupling agent or any chemical substance identified in Hedrick et al. as a coupling agent (column 9, lines 35-68, and column 10, lines 1-36), whereas Hedrick et al. indicate that the addition of a coupling agent is "essential" for the invention (column 9, lines 28-30). Because the absence of an "essential" agent renders Hedrick et al. ineffective and unsatisfactory for its intended purpose, there is no suggestion or motivation to modify Hedrick et al. by removing the coupling agent.

D. Prior Art Teaches Away

"A *prime facie* case of obviousness may also be rebutted by showing that the art, in any material respect, teaches away from the claimed invention." *In re Geisler*, 116 F. 3d 1465, 1471, 43 USPQ 2d 1362, 1366 (Fed. Cir. 1997); MPEP § 2143.05 (III).

Claims 32-72 call for a composition comprising a thermoplastic resin and a material, including aluminosilicate material or silicon dioxide and aluminum oxide. As indicated throughout the specification of the present continuation-in-part application and on page 13, lines 15-16 of U.S. Application Serial No. 09/322,211, parent to the present application and now abandoned, the material can include both crystalline and amorphous materials. In contrast, Hedrick et al. indicate that crystallinity is an important feature of fillers, and that only crystalline fillers, as opposed to amorphous materials, are useful. (column 6, lines 16-34). Hedrick et al. teach away from amorphous materials

E. Summary

In summary, Hedrick et al. cannot teach or suggest a composition which lacks the essential coupling agent in Hedrick et al. Also, modification of Hedrick et al. in